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Nakamura et al.

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(54) **MANUFACTURING METHOD AND MANUFACTURING EQUIPMENT OF COMPOSITE SHEET OF ABSORBENT ARTICLE**

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A61F 13/15 (2006.01)
B65H 37/04 (2006.01)

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CPC ***A61F 13/15609*** (2013.01); ***B65H 37/04*** (2013.01); *A61F 13/15593* (2013.01); *B65H 2801/57* (2013.01)

(58) **Field of Classification Search**
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USPC 493/374, 380–382; 156/73.6, 161, 163, 156/323, 461; 28/116
See application file for complete search history.

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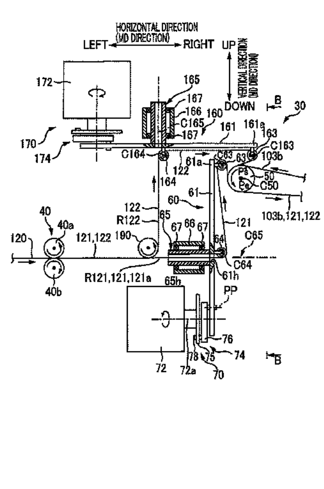
(57) **ABSTRACT**

A manufacturing method of a composite sheet of an absorbent article, the method includes joining a continuous body of an elastic member in a predetermined meander pattern in respect to a continuous body of a sheet transported continuously in a transporting direction, the method includes: transporting the continuous body of the sheet by wrapping the continuous body of the sheet around an outer circumferential face of a transporting roll that rotates in a direction along the transporting direction; and joining the continuous body of the elastic member to a portion of the continuous body of the sheet wrapped around the transporting roll by feeding the continuous body of the elastic member to the continuous body of the sheet via an oscillating arm that oscillates in an intersecting direction intersecting the transporting direction with a spindle portion as a swivel fulcrum, wherein the oscillating arm includes an oscillating end side roller arranged at an oscillating end side of the oscillating arm and a spindle portion side roller arranged at a spindle portion side, wherein in the joining, the continuous body of the elastic member supplied toward the spindle portion side roller through a supply route along a rotational central axis direction of the spindle portion is put around an outer circumferential face of the spindle portion side roller and an outer circumferential face of the oscillating arm successively and guided to the continuous body of the sheet, and a driving force to make the oscillating arm oscillate is input at a position on the oscillating arm different from the spindle portion.

7 Claims, 7 Drawing Sheets



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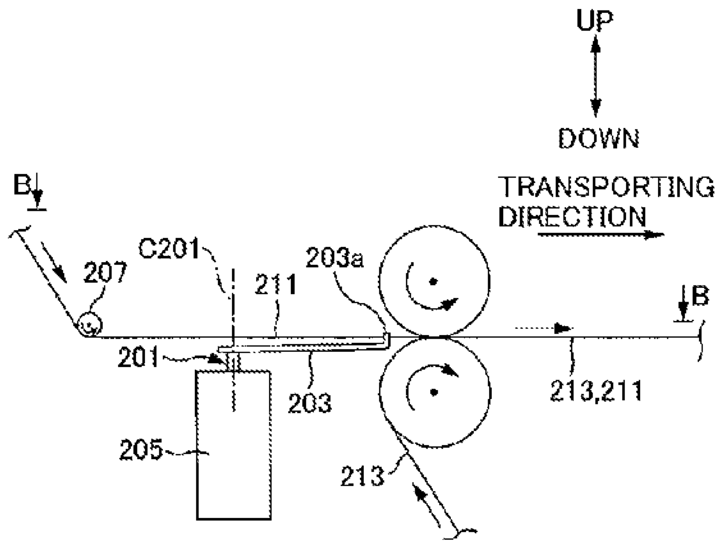
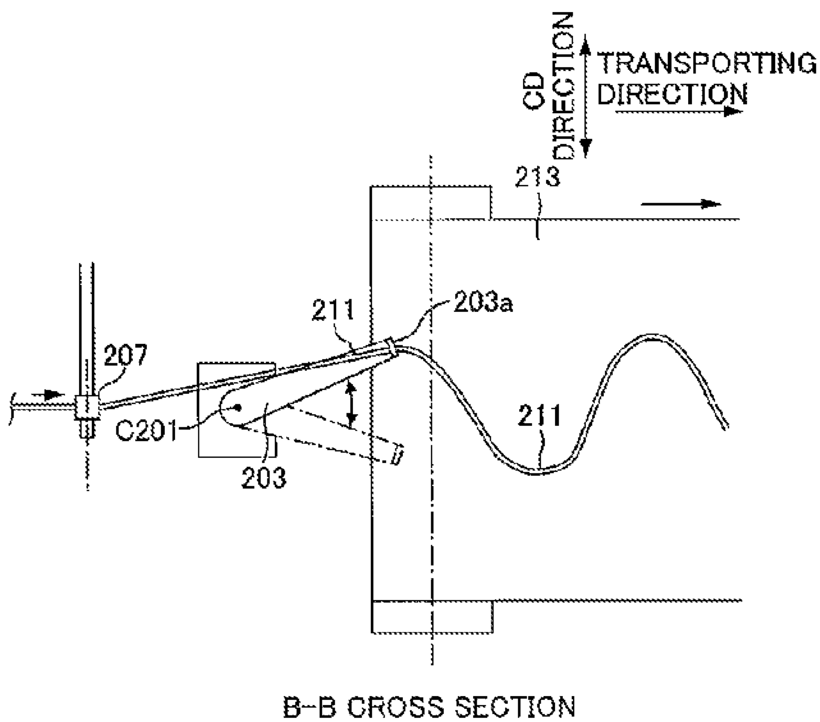


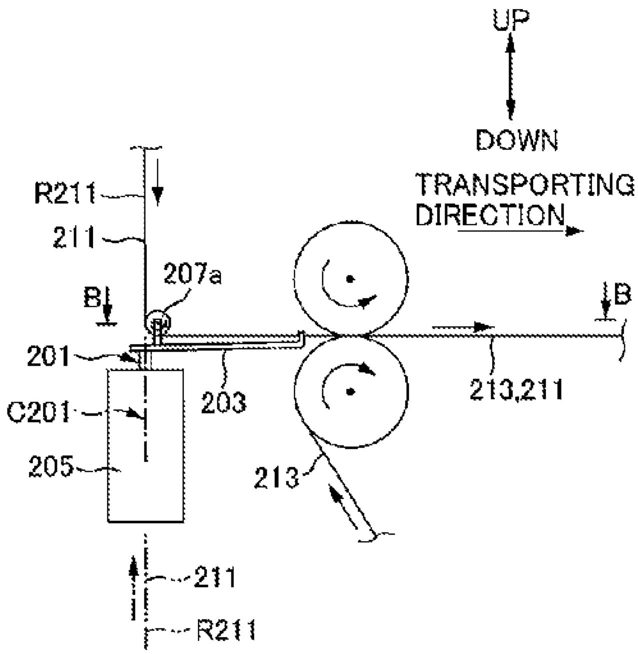
PRIOR ART

FIG. 1A



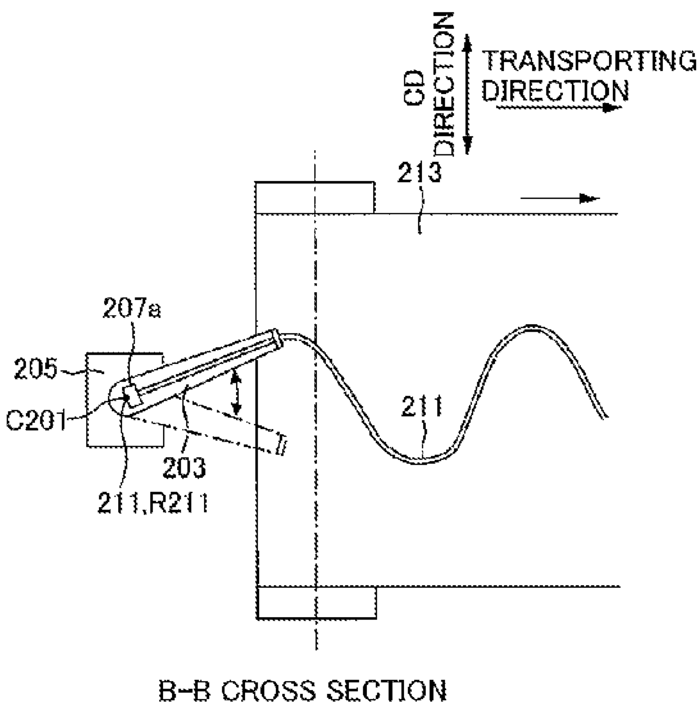
PRIOR ART

FIG. 1B



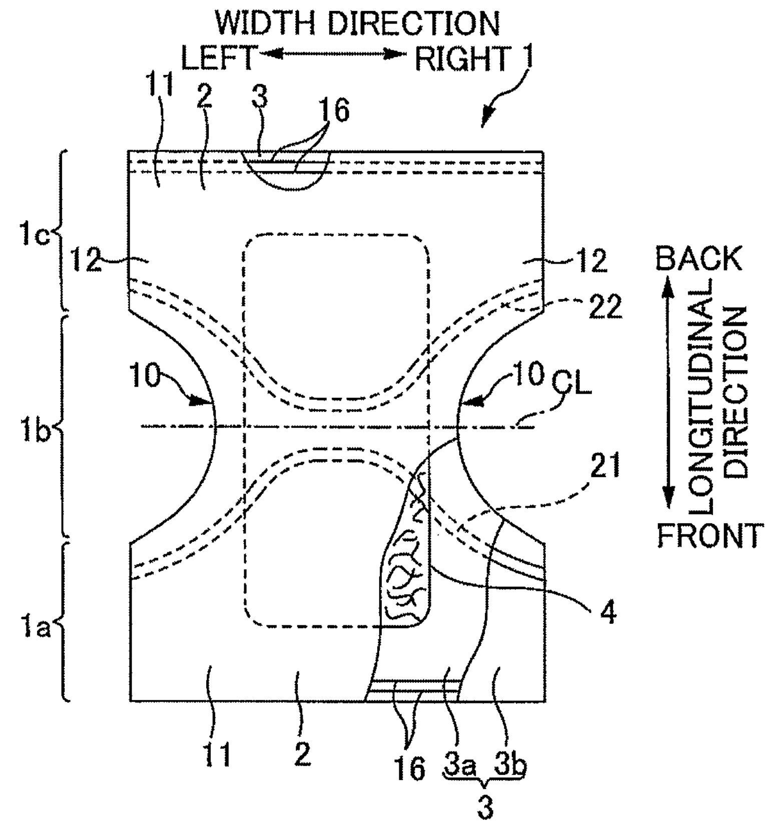
PRIOR ART

FIG. 2A



PRIOR ART

FIG. 2B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1
11
2
3
16
1c
12
12
BACK
LONGITUDINAL DIRECTION
22
10
10
CL
1b
21
FRONT
4
1a
11
2
16
3a
3b
3

FIG. 3A

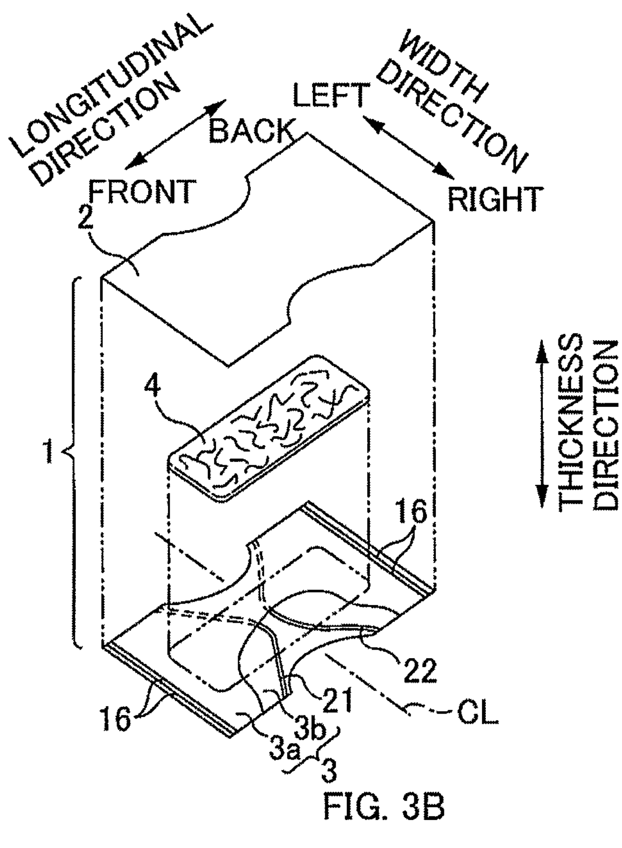
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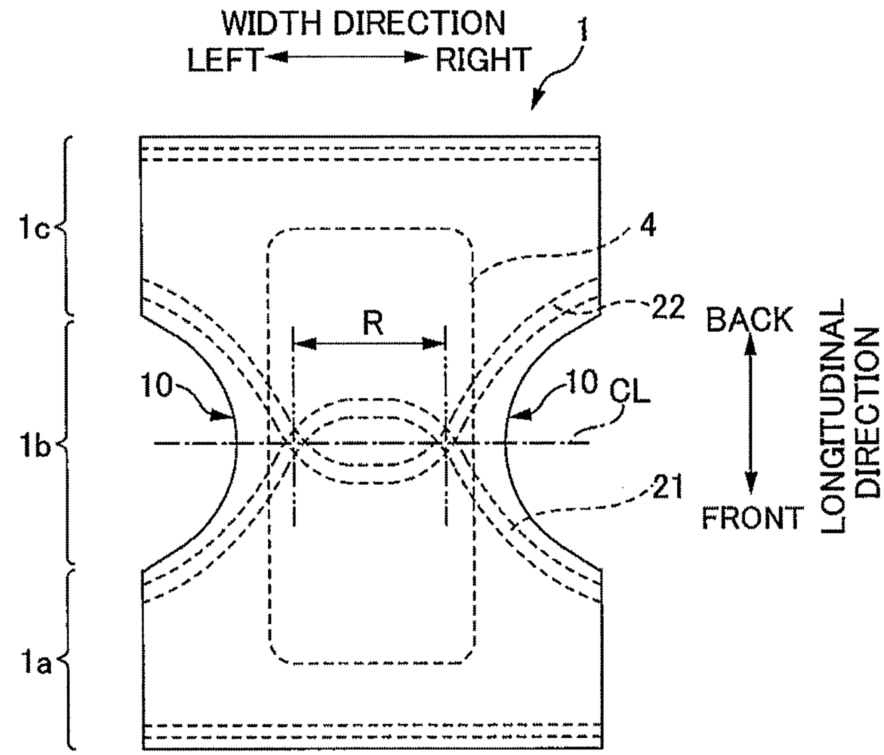
FIG. 3B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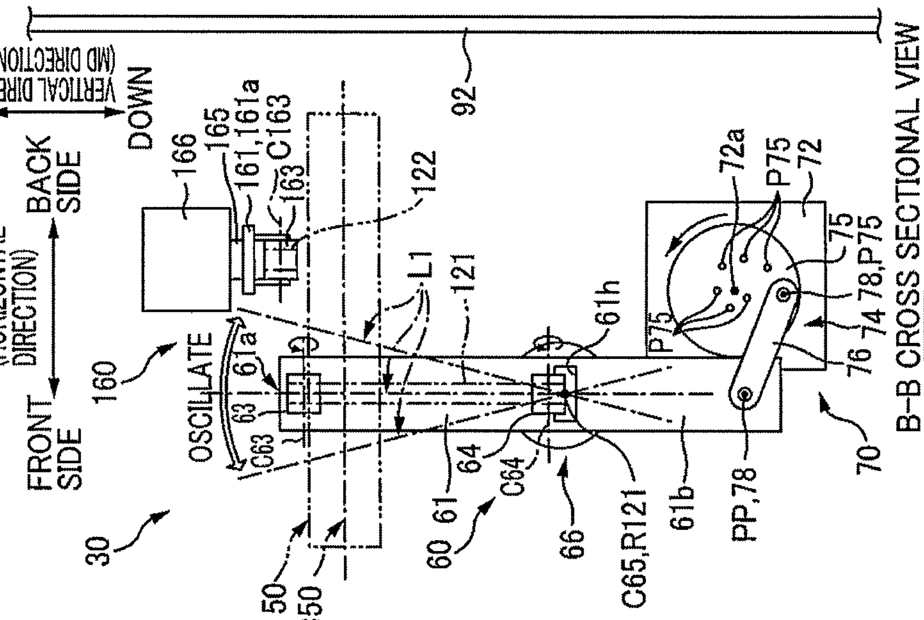
1a

FIG. 4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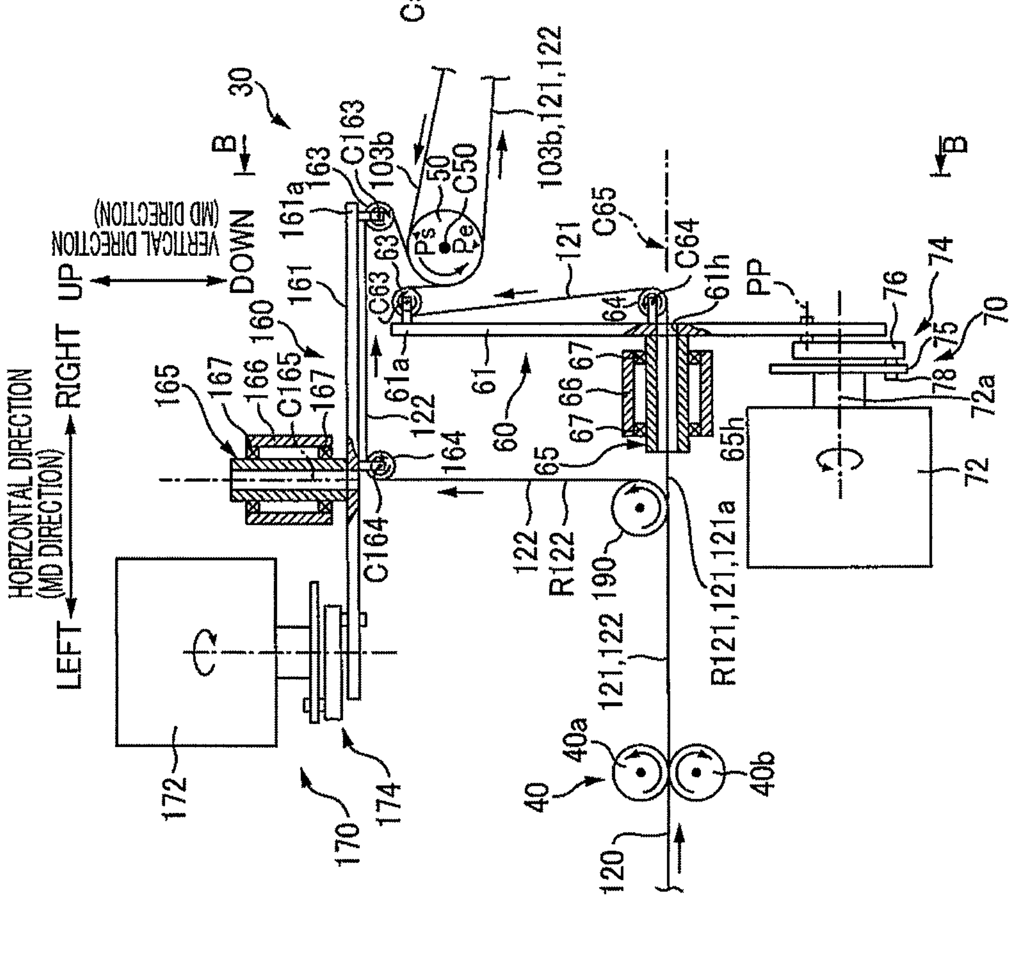
DOWN
VERTICAL DIRECTION
(MD DIRECTION)
CD DIRECTION
(HORIZONTAL
DIRECTION)
BACK
SIDE
FRONT
SIDE
OSCILLATE
B-B CROSS SECTIONAL VIEW

FIG. 5B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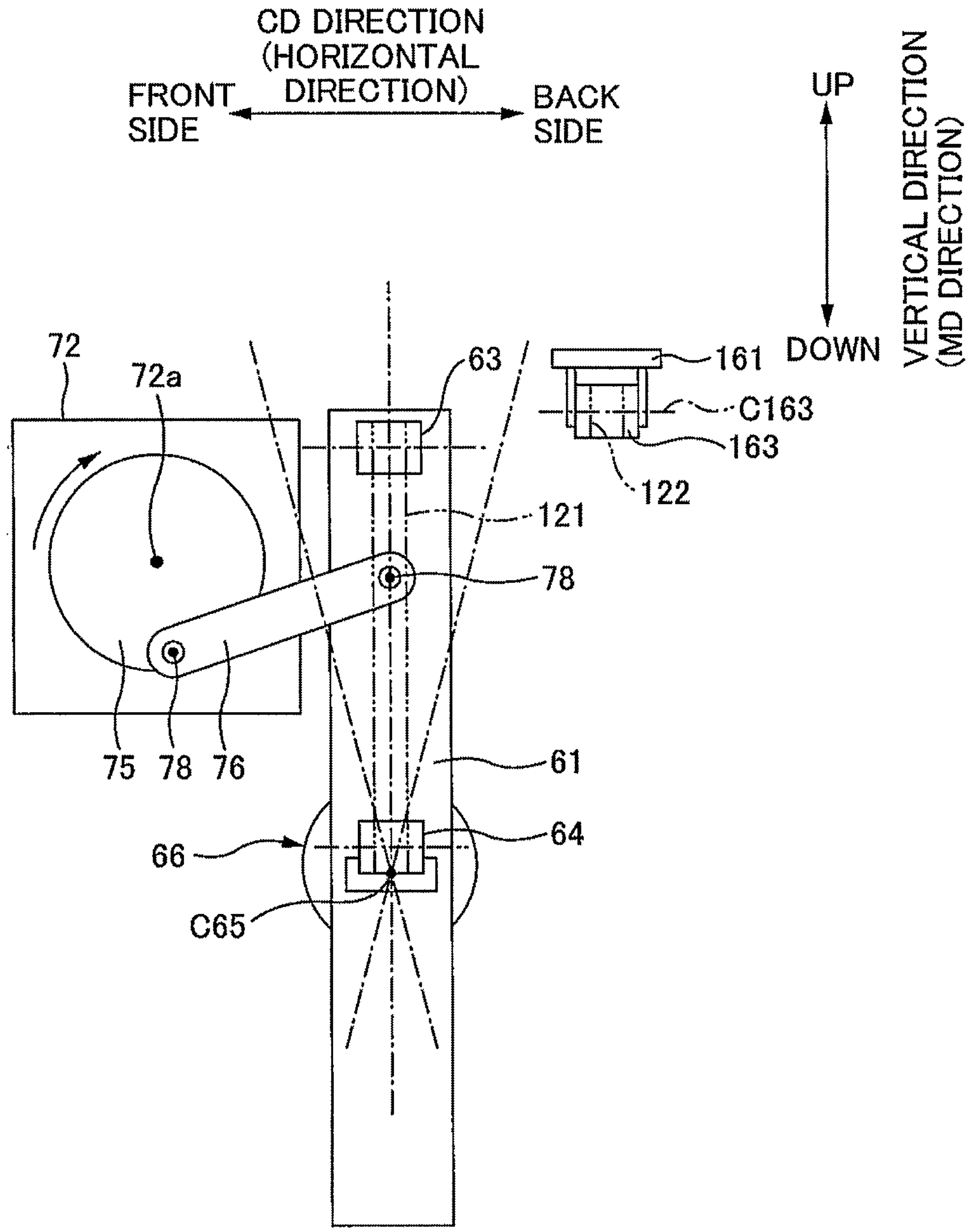
(MD DIRECTION)

FIG. 5A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SIDE
UP
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VERTICAL DIRECTION
(MD DIRECTION)
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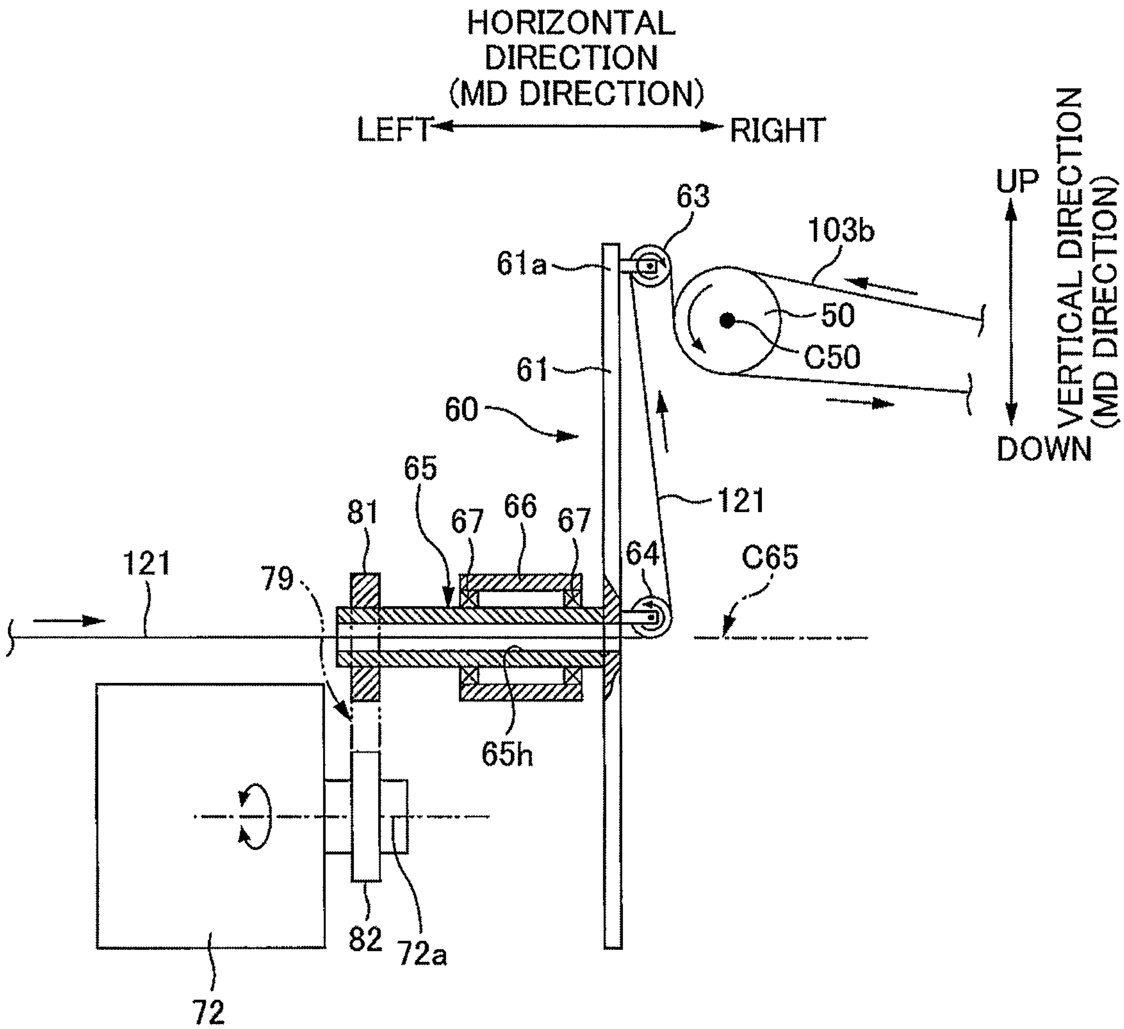
72a
63
161
C163
163
122
121
78
75
78
76
61
64
66
C65

FIG. 6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(MD DIRECTION)
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VERTICAL DIRECTION
(MD DIRECTION)
UP
DOWN
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103b
61a
50
C50
61
60
121
65
81
66
67
67
64
C65
121
79
65h
82
72a
72

FIG. 7

MANUFACTURING METHOD AND MANUFACTURING EQUIPMENT OF COMPOSITE SHEET OF ABSORBENT ARTICLE

RELATED APPLICATIONS

The present application is a national phase of PCT/JP2010/055541, filed Mar. 29, 2010 and is based on, and claims priority from, Japanese Application Number 2009-091504, filed Apr. 3, 2009.

TECHNICAL FIELD

The present invention relates to manufacturing methods and manufacturing equipment of composite sheets of absorbent articles.

BACKGROUND ART

A disposable diaper and the like have conventionally been known as an example of an absorbent article that absorbs body waste fluid. In its manufacturing line, a continuous body of a sheet that is transported continuously in a transporting direction is attached continuously with a continuous body of an elastic member in a meander pattern such as a sine curve.

As an example of such an attaching method, Patent Literature 1 discloses that a continuous body of the elastic member **211** is attached to a sheet **213** using an oscillating arm **203** that swivels and oscillates around a rotational central axis C**201** of a predetermined spindle portion **201** as shown in a side view of FIG. **1**A, and a B-B cross sectional view of FIG. **1**A as shown in FIG. **1**B. That is, a through hole is provided at an oscillating end **203***a* of the oscillating arm **203**, and a continuous body of the elastic member **211** is passed through this through hole. With the oscillating movement of the oscillating arm **203** around the rotational central axis C**201**, the oscillating end **203***a* is oscillated in a CD direction that intersects the transporting direction of the sheet **213**, thereby a continuous body of the elastic member **211** is attached in a predetermined meander pattern in respect to the sheet **213** that is transported in the transporting direction.

Further, PTL 1 also discloses a driving mechanism of the oscillating arm **203**, that is, there is described that a drive rotational shaft of a motor **205** is directly connected concentrically to a spindle portion **201** of the oscillating arm **203**.

CITATION LIST

Patent Literature

PTL 1: JP-A-2004-159866

SUMMARY OF INVENTION

Technical Problem

Here, a continuous body of the elastic member **211** is directly sent to the through hole of the oscillating end **203***a* of the oscillating arm **203** from a guide roller **207** supported by a portion other than the oscillating arm **203**. Thus, in the case where an amplitude amount of oscillation of the oscillating arm **203** is large, there is fear that a travel state of the continuous body of the elastic member **211** becomes unstable, such as it becomes likely for the continuous body of the elastic member **211** to fall of the guide roller **207**.

From the view of stability of this travel state, as in the side view of FIG. **2**A, and the B-B cross sectional view in FIG. **2**A shown in FIG. **2**B, it is considered effective to support a guide roller **207***a* in a portion to the spindle portion **201** side in the oscillating arm **203**, and at the time of supplying the continuous body of the elastic member **211** toward the guide roller **207***a*, to make a supply route P**211** follow along a direction of a rotational central axis C**201** of the spindle portion **201**.

Further, at the upper side of the spindle portion **201**, it is possible to set the above described preferable supply route P**211** as shown in FIG. **2**A. However, as shown in FIG. **2**A in a chain double-dashed line, there is a case where the preferable supply route **211** has to be set at a lower side of the spindle portion **201**.

But, in this case, the motor **205** is provided at the lower side of the spindle portion **201**, so that the motor **205** gets in the way, and it becomes difficult to set the above preferable supply route P**211**.

The invention has been made in view of the problems described above, and an advantage is that it is possible to easily set a supply route of a continuous body of an elastic member that goes toward a spindle portion along a rotational central axis direction of the spindle portion of an oscillating arm, and thereby to improve travel stability of the continuous body of the elastic member.

Solution to Problem

In order to achieve the above-described advantages, an aspect of the invention is a manufacturing method of a composite sheet of an absorbent article, the method including joining a continuous body of an elastic member in a predetermined meander pattern in respect to a continuous body of a sheet transported continuously in a transporting direction, the method including:

transporting the continuous body of the sheet by wrapping the continuous body of the sheet around an outer circumferential face of a transporting roll that rotates in a direction along the transporting direction; and

joining the continuous body of the elastic member to a portion of the continuous body of the sheet wrapped around the transporting roll by feeding the continuous body of the elastic member to the continuous body of the sheet via an oscillating arm that oscillates in an intersecting direction intersecting the transporting direction with a spindle portion as a swivel fulcrum,

wherein the oscillating arm includes an oscillating end side roller arranged at an oscillating end side of the oscillating arm and a spindle portion side roller arranged at a spindle portion side,

wherein in the joining, the continuous body of the elastic member supplied toward the spindle portion side roller through a supply route along a rotational central axis direction of the spindle portion is put around an outer circumferential face of the spindle portion side roller and an outer circumferential face of the oscillating end side roller successively and guided to the continuous body of the sheet, and

wherein a driving force to make the oscillating arm oscillate is input at a position on the oscillating arm different from the spindle portion.

Another aspect of the invention is a manufacturing equipment of a composite sheet of an absorbent article, the equipment including joining a continuous body of an elastic member in a predetermined meander pattern in respect to a continuous body of a sheet transported continuously in a transporting direction, the equipment including:

a transporting roll that rotates in a direction along the transporting direction and transports the continuous body of the sheet by wrapping around the continuous body of the sheet on an outer circumferential face; and

an oscillating arm

that oscillates in an intersecting direction intersecting the transporting direction with a spindle portion as a swivel fulcrum and

that joins the continuous body of the elastic member to a portion of the continuous body of the sheet wrapped around the transporting roll by feeding the continuous body of the elastic member to the continuous body of the sheet,

wherein the oscillating arm includes an oscillating end side roller arranged at an oscillating end side of the oscillating arm and a spindle portion side roller arranged at a spindle portion side,

wherein the continuous body of the elastic member supplied toward the spindle portion side roller through a supply route along a rotational central axis direction of the spindle portion is put around an outer circumferential face of the spindle portion side roller and an outer circumferential face of the oscillating end side roller successively and guided to the continuous body of the sheet, and

wherein a driving force to make the oscillating arm oscillate is input at a position on the oscillating arm different from the spindle portion.

Other features of the present invention will be made clear through the present specification with reference to the accompanying drawings.

Advantageous Effects of Invention

According to this invention, it is possible to easily set a supply route of a continuous body of an elastic member that goes toward a spindle portion along a rotational central axis direction of the spindle portion of an oscillating arm, and thereby can improve travel stability of the continuous body of the elastic member.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1**A is a perspective view of a conventional method of attaching a continuous body of an elastic member **211** in a predetermined meander pattern in respect to a continuous body of a sheet **213**, and FIG. **1**B is a cross-sectional view taken along B-B in FIG. **1**A.

FIG. **2**A is a perspective view of a method of the same illustrative example, and FIG. **2**B is a cross-sectional view taken along B-B in FIG. **2**A.

FIG. **3**A is a partially cutaway plan view of a diaper **1**, and FIG. **3**B is an exploded perspective view of the diaper.

FIG. **4** is a perspective view of the diaper **1** with elastic strip members **21**, **22** arranged so as to intersect with each other at a returning portion of each meander pattern.

FIG. **5**A is a perspective view showing a partially cutaway manufacturing equipment **30** of this embodiment, and FIG. **5**B is a cross-sectional view taken along B-B in FIG. **5**A.

FIG. **6** is an explanatory diagram showing other examples of positions of points PP where a force is applied on an oscillating arm.

FIG. **7** is an explanatory diagram showing another embodiment of a driving mechanism **70** (**170**).

DESCRIPTION OF EMBODIMENTS

At least the following matters will become clear through the description of the present specification and the accompanying drawings.

A manufacturing method of a composite sheet of an absorbent article, the method including joining a continuous body of an elastic member in a predetermined meander pattern in respect to a continuous body of a sheet transported continuously in a transporting direction, the method including:

transporting the continuous body of the sheet by wrapping the continuous body of the sheet around an outer circumferential face of a transporting roll that rotates in a direction along the transporting direction; and

joining the continuous body of the elastic member to a portion of the continuous body of the sheet wrapped around the transporting roll by feeding the continuous body of the elastic member to the continuous body of the sheet via an oscillating arm that oscillates in an intersecting direction intersecting the transporting direction with a spindle portion as a swivel fulcrum,

wherein the oscillating arm includes an oscillating end side roller arranged at an oscillating end side of the oscillating arm and a spindle portion side roller arranged at a spindle portion side,

wherein in the joining, the continuous body of the elastic member supplied toward the spindle portion side roller through a supply route along a rotational central axis direction of the spindle portion is put around an outer circumferential face of the spindle portion side roller and an outer circumferential face of the oscillating end side roller successively and guided to the continuous body of the sheet, and

wherein a driving force to make the oscillating arm oscillate is input at a position on the oscillating arm different from the spindle portion.

With this manufacturing method of the composite sheet of the absorbent article, it is possible to oscillate the oscillating arm without directly connecting concentrically a drive rotational axis of the driving source of the oscillating arm in respect to the spindle portion. Thus, the driving source does not have to be arranged close to the spindle portion, and as a result the continuous body of the elastic member can be easily supplied toward the spindle portion through the supply route along the rotational central axis direction of the spindle portion.

Further, the portion at the spindle portion side of the oscillating arm is provided with the spindle portion side roller, and the continuous body of the elastic member is fed to the spindle portion side roller along the rotational central axis direction of the spindle portion. Thus, the movement in the intersecting direction of the continuous body of the elastic member that may occur due to the oscillating movement of the oscillating arm appears mainly as a torsion in the portion of the continuous body of the elastic member positioned at the upstream side than the spindle portion side roller and is absorbed there, and for this reason falling off of the continuous body of the elastic member from the spindle portion side roller is effectively prevented. As a result, stability in the travel state of the continuous body of the elastic member is obtained.

A manufacturing method of a composite sheet of an absorbent article, wherein preferably

the oscillating end side roller and the spindle portion side roller are arranged on a face of the oscillating arm on a side opposing the transporting roll,

the spindle portion is formed with a communicating space that communicates the side opposing the transporting roll and a side not opposing the transporting roll, along the rotational central axis direction of the spindle portion,

the continuous body of the elastic member that is fed through the supply route along the rotational central axis direction of the spindle portion reaches a face of the oscillating arm on the side not opposing the transporting roll, and ends at the spindle portion side roller by passing through the communicating space.

With this manufacturing method of the composite sheet of the absorbent article, in the case where the continuous body of the elastic member is fed toward a face of the oscillating arm that is at a side opposite the face on which the spindle portion side roller is provided (namely, the surface on a side not opposing the transporting roll), it becomes possible to surely put the continuous body of the elastic member around the spindle portion side roller, by passing it through the communicating space of the spindle portion.

A manufacturing method of a composite sheet of an absorbent article, wherein preferably

the communicating space is a through hole formed in the spindle portion along the rotational central axis direction of the spindle portion.

With this manufacturing method of the composite sheet of the absorbent article, in the case where the continuous body of the elastic member is fed toward a face of the oscillating arm that is at a side opposite the face on which the spindle portion side roller is provided (namely, the face on a side not opposing the transporting roll), it becomes possible to surely put the continuous body of the elastic member around the spindle portion side roller, by passing it through the communicating space of the spindle portion.

A manufacturing method of a composite sheet of an absorbent article, wherein preferably the rotational central axis of the spindle portion is in contact with

an outer circumferential face of the spindle portion side roller.

With this manufacturing method of the composite sheet of the absorbent article, the rotational central axis of the spindle portion is contacting the outer circumferential face of the spindle portion side roller. Thus, the continuous body of the elastic member is surely fed to the spindle portion side roller along a rotational central axis direction of the spindle portion. As a result, a movement in the intersecting direction of the continuous body of the elastic member that may occur due to the oscillating movement of the oscillating arm surely appears as torsion in the portion of the elastic member that is to the upstream side than the spindle portion side roller and is absorbed there. As a result, falling off of the continuous body of the elastic member from the spindle portion side roller can be effectively prevented.

A manufacturing method of a composite sheet of an absorbent article, wherein preferably

in order to input the driving force to the oscillating arm,

a driving source having a drive rotational axis that is rotatingly driven and

a conversion transmission mechanism that converts a rotating movement of the drive rotational axis to a reciprocating movement and transmits the reciprocating movement to the position on the oscillating arm

are included,

the conversion transmission mechanism having

a rotating member attached integrally to the drive rotational axis and

a coupling member that couples the position on the oscillating arm to a position eccentric from the drive rotational axis of the rotating member, and

the rotating member is set with a plurality of the eccentric positions each having different eccentric amounts from each other.

With this manufacturing method of the composite sheet of the absorbent article, by selecting the eccentric position on the rotating member, the amplitude amount of the oscillating arm can be changed. Thus, by selecting the eccentric position according to the meander pattern of the elastic member, it is possible to easily change to a desired meander pattern.

A manufacturing method of a composite sheet of an absorbent article, wherein preferably

the transporting roll rotates around a rotational axis,

the oscillating end side roller and the spindle portion of the oscillating arm are arranged so as to sandwich the rotational axis of the transporting roll in between, and

a direction of travel of the continuous body of the elastic member is reversed by the oscillating end side roller and the continuous body of the elastic member is supplied to the transporting roll.

With this manufacturing method of the composite sheet of the absorbent article, it becomes possible to ensure a large wrap around angle of the continuous body of the elastic member to the oscillating end side roller. For this reason, the continuous body of the elastic member can be tightly held on the outer circumferential face of the oscillating end side roller. As a result, stability in the travel state of the continuous body of the elastic member, such as being able to effectively prevent falling off of the continuous body of the elastic member from the oscillating end side roller, is obtained.

Further, in the case where the continuous body of the elastic member is a continuous body of a strip member, the continuous body of the strip member can be fed to the sheet by being maintained in a substantially flat shape, and as a result, the continuous body of the strip member can be made to come in surface contact with the sheet and can be joined. Namely, by reversing the above-described travel direction, the continuous body of the strip members is wrapped around the outer circumferential face of the oscillating end side roller at a large wrap around angle. Therefore, the continuous body of the strip members is restrained in a substantially flat shape by the outer circumferential face, and as a result the continuous body surely comes in surface contact with the sheet and is joined.

A manufacturing method of a composite sheet of an absorbent article, wherein preferably

the spindle portion side roller is supported on the oscillating arm so that an orientation of the roller in respect to the oscillating arm cannot be changed, in a state in which the outer circumferential face of the spindle portion side roller is facing toward the oscillating end of the oscillating arm.

With this manufacturing method of the composite sheet of an absorbent article, the outer circumferential face of the spindle portion side roller faces toward the oscillating end side roller according to the oscillating movement of the oscillating end side roller. Therefore, even if the oscillating end side roller changes its position in the intersecting direction due to the oscillating movement, the continuous body of the elastic member can be surely fed toward the oscillating end side roller. As a result, stability in the travel state of the continuous body of the elastic member, such as effectively preventing falling off of the continuous body of the elastic member from the oscillating end side roller, is obtained.

Further, the outer circumferential face of the spindle portion side roller can be made to always face the oscillating end, so as to completely synchronize with the oscillating movement of the oscillating arm.

A manufacturing method of a composite sheet of an absorbent article, wherein preferably

the intersecting direction is perpendicular to the transporting direction, the rotational central axis direction of the spindle portion is perpendicular to a rotational axis at which the transporting roll is to be rotated in a direction along the transporting direction,

the oscillating end side roller is arranged so that a rotational axis of the oscillating end side roller is perpendicular to the rotational central axis direction of the spindle portion, and

the spindle portion side roller is arranged so that a rotational axis of the spindle portion is perpendicular to the rotational central axis direction of the spindle portion.

With this manufacturing method of the composite sheet of an absorbent article, orientation of each rotational axis of the transporting roll, the oscillating end side roller, and the spindle portion side roller, is in a perpendicular relationship in respect to the rotational central axis direction of the spindle portion. Therefore, the torsion in the continuous body of the elastic member at the time the continuous body of the elastic member is handed over from the oscillating end side roller to the transporting roll can be suppressed, and the continuous body of the elastic member can be made to surely come in surface contact with the continuous body of the sheet.

A manufacturing equipment of a composite sheet of an absorbent article, the equipment including joining a continuous body of an elastic member in a predetermined meander pattern in respect to a continuous body of a sheet transported continuously in a transporting direction, the equipment including:

a transporting roll that rotates in a direction along the transporting direction and transports the continuous body of the sheet by wrapping around the continuous body of the sheet on an outer circumferential face; and

an oscillating arm

that oscillates in an intersecting direction intersecting the transporting direction with a spindle portion as a swivel fulcrum and

that joins the continuous body of the elastic member to a portion of the continuous body of the sheet wrapped around the transporting roll by feeding the continuous body of the elastic member to the continuous body of the sheet,

wherein the oscillating arm includes an oscillating end side roller arranged at an oscillating end side of the oscillating arm and a spindle portion side roller arranged at a spindle portion side,

wherein the continuous body of the elastic member supplied toward the spindle portion side roller through a supply route along a rotational central axis direction of the spindle portion is put around an outer circumferential face of the spindle portion side roller and an outer circumferential face of the oscillating end side roller successively and guided to the continuous body of the sheet, and

wherein a driving force to make the oscillating arm oscillate is input at a position on the oscillating arm different from the spindle portion.

With this manufacturing method of the composite sheet of an absorbent article, the oscillating arm can be oscillated without directly connecting concentrically the drive rotational axis of the driving source of the oscillating arm in respect to the spindle portion. Therefore, the driving source does not have to be arranged close to the spindle portion, and as a result the continuous body of the elastic member can be easily supplied toward the spindle portion through the supply route along the rotational central axis direction of the spindle portion.

Furthermore, the portion at the spindle portion side of the oscillating arm is provided with a spindle portion side roller, and the continuous body of the elastic member is fed to the spindle portion side roller along the rotational central axis direction of the spindle portion. Therefore, movement of the continuous body of the elastic member in the intersecting direction that may occur due to the oscillating movement of the oscillating arm appears mainly as torsion in the portion of the continuous body of the elastic member positioned to the upstream side than the spindle portion side roller and is absorbed there. As a result, falling off of the continuous body of the elastic member from the spindle portion side roller can be effectively prevented. As a result, stability in the travel state of the continuous body of the elastic member is obtained.

The Present Embodiment

A manufacturing method and a manufacturing equipment of a sheet of the present embodiment is applied to, for example, a manufacturing line of a disposable diaper **1** (corresponds to an absorbent article).

Diaper **1**

FIG. **3**A is a partially cutaway plan view of a diaper **1**, and FIG. **3**B is an exploded perspective view of the diaper. Both diagrams show an expanded state in which a front torso area **1***a* and a back torso area **1***c* in a flank portion of a pants-type diaper **1** are separated.

This diaper **1** has a longitudinal direction and a width direction and a thickness direction, that are perpendicular to each other, and along the longitudinal direction of the diaper **1** are defined the front torso area **1***a*, a crotch area **1***b*, and the back torso area **1***c*. Further, the diaper **1** has in the thickness direction, a fluid permeable surface sheet **2**, a fluid impermeable back face sheet **3**, and a fluid-absorbent absorbent body **4** arranged in between the sheets **2**, **3**. The surface sheet **2** and the back face sheet **3** are overlapped in a portion extending outward from a peripheral edge of the absorbent body **4**, and joined to each other by such as a hot-melt adhesive. Thereby, end edge portion flaps **11** are formed to the front and back in the longitudinal direction and side edge portion flaps **12** are formed to the left and right in the width direction. Note that, in the crotch area **1***b* of the side edge portion flaps **12**, are formed around-leg concave portions **10** that are formed curved inwardly in the width direction, and the diaper **1** is a substantially hourglass shape overall.

For the surface sheet **2**, for example, a fluid permeable plastic film or a nonwoven fabric is used.

The back face sheet **3** has an inner sheet **3***a* facing the surface sheet **2**, an outer sheet **3***b* facing the inner sheet **3***a*, and both these sheets **3***a*, **3***b* are in a same shape and same size to each other, and are joined by adhesion or welding. As the inner sheet **3***a*, a liquid impermeable plastic film or a nonwoven fabric is used, and as the outer sheet **3***b*, an air-permeable nonwoven fabric is used.

Each of the end edge portion flaps **11** of the front and back torso areas **1***a*, **1***c* are joined with a torso elastic member **16** in a stretched state to the surface and back face sheets **2**, **3**.

Further, the crotch area **1***b* and its proximity is provided with a front elastic strip member **21** and a back elastic strip member **22** across and along a width direction of the diaper **1**. As these elastic strip members **21**, **22**, for example, nonwoven fabric having stretchability or strip shaped rubber and the like is used. These elastic strip members **21**, **22** each extend in a width direction in a predetermined meander pattern that is curved in a convex shape toward a center line CL that divides the diaper **1** substantially in half to the front and back in the longitudinal direction, and the elastic strip members **21**, **22** are provided in between the inner sheet **3***a* and the outer sheet **3***b* that structure the back face sheet **3** and, for example, are joined to an inner face of the outer sheet **3***b* in a stretched state. These front and back elastic strip members **21**, **22** cooperate to give elasticity around the around-leg concave portions **10**.

Note that, here, a sine curve is illustrated as an example as the meander pattern of these elastic strip members **21**, **22**, but the meander pattern can be appropriately changed so that the around-leg convex portions **10** can effectively fit around the leg of the wearer of the diaper.

Further, in order to increase fitting around substantially the entire length of the around-leg concave portion **10**, as shown in FIG. **4**, the elastic strip members **21**, **22** may be arranged to intersect each other at the returning portion of each meander pattern, and further in order to weaken the elasticity in the intersecting region R, a portion of the elastic strip members **21**, **22** belonging to the intersecting region R can be divided. Incidentally, elasticity of this intersected region R is weakened because if there is elasticity at the absorbent body **4** portion, creases are formed in the absorbent body **4**, and there is fear that fluid absorption performance may deteriorate.

Manufacturing Method and Manufacturing Equipment **30** of a Composite Sheet of this Embodiment

Such a diaper **1** is to be completed by a base material of the diaper **1** that is continuously flowing in the manufacturing line being joined and the like with various structural components. The manufacturing method and the manufacturing equipment **30** of the composite sheet according to this embodiment carry out one of the processes. That is, here the manufacturing method and the manufacturing equipment **30** are applied in a process of attaching in the above-described meander pattern a continuous body of an elastic strip member **121** to be the above-described front elastic strip member **21** (corresponds to a continuous body of an elastic member, herein referred to as an elastic strip member **121**) and a continuous body of an elastic strip member **122** to be the above-described back elastic strip member **22** (corresponds to a continuous body of an elastic member, herein referred to as an elastic strip member **122**) to a continuous body of a sheet **103***b* to be an outer sheet **3***b* of the above-described back face sheet **3** (herein referred to as a sheet **103***b*).

FIG. **5**A is a perspective view showing a partially cutaway manufacturing equipment **30** of this process, and FIG. **5**B is a cross-sectional view taken along B-B in FIG. **5**A. Note that, hereinbelow, a width direction of the manufacturing equipment **30** is referred to as a CD direction or front side-back side. Further, a direction that is perpendicular to the CD direction is referred to as an MD direction. That is, the MD direction is an arbitrary direction in a plane that is perpendicular to the CD direction. Further, regarding the MD direction, as shown in FIG. **5**A, the two direction that are perpendicular to each other are defined as an up-down direction (vertical direction) and a left-right direction (horizontal direction). Incidentally, as shown in FIG. **5**B, the CD direction is also in a horizontal direction, and is in a perpendicular relation to the left-right direction in the horizontal direction.

This manufacturing equipment **30** includes (1) a transporting roll **50** that transports the sheet **103***b* in the MD direction (corresponds to the transporting direction) by wrapping the sheet **103***b* around in a predetermined wrapping angle and rotating, (2) a slitting apparatus **40** arranged to a left side of the transporting roll **50** and that divides in two in the center in the CD direction a sheet member **120**, that is an original sheet made of an elastic strip member that is sent continuously from the left, and forms a pair of elastic strip members **121**, **122**, (3) a first guide member **60** that continuously feeds the elastic strip member **121** in a stretched state to a portion of the sheet **103***b* that is wrapped around an outer circumferential face of the transporting roll **50** and joins them, and (4) a second guide member **160** that continuously feeds the elastic strip member **122** in a stretched state to a portion of the same sheet **103***b* and joins them.

These first and second guide members **60**, **160** each feed the elastic strip members **121**, **122** that they are in charge of toward the sheet **103***b* in the MD direction and reciprocates the elastic strip members **121**, **122** in the CD direction (corresponds to an intersecting direction). Thus, each of the elastic strip members **121**, **122** are overlapped on the sheet face of the sheet **103***b* and joined while the joining position to the sheet **103***b* in the CD direction is changed every moment continuously. As a result, the sheet face of the sheet **103***b* is attached in a surface contact state with a pair of the elastic strip members **121**, **122** in an intended meander pattern such as a sine curve.

Incidentally, it is needless to say that before joining each of the elastic strip members **121**, **122** to the sheet **103***b*, a hot-melt adhesive is to be applied to each of the elastic strip members **121**, **122** by an adhesive applying apparatus that is not shown.

Hereinbelow, each structural element **40**, **50**, **60**, **160** is described. Note that, in the below description, unless specifically stated, each structural device according to the manufacturing equipment **30** is cantilevered via an appropriate bracket that is not shown by a vertical support wall **92** (namely a panel) that extends along an entire length of the manufacturing equipment **30** in the MD direction. That is, as shown in FIG. **5**B, at a back side in the CD direction (a back side of a plane of paper in FIG. **5**A) is provided the support wall **92** along a direction substantially parallel to the MD direction (a direction substantially parallel to the plane of paper). A vertical wall face of this support wall **92** supports portions at the back side in the CD direction of each structural device, and portions at the front side are in a not supported state.

(1) Transporting Roll **50**

The transporting roll **50** has a cylindrical body with a rotational axis C**50** in the horizontal CD direction as a main body, and rotates anti-clockwise in a predetermined peripheral speed in a direction along the MD direction as a rotational direction. This transporting roll **50** is supplied with the sheet **103***b* from the right substantially horizontally, for example. With an approximately 12 o'clock position at an upper portion of the transporting roll **50** as a wrap around starting position Ps, the sheet **103***b* is wrapped around an outer circumferential face of the transporting roll **50**, from the position Ps at a wrap around angle of, for example, 180° to 200°, and its transporting direction is reversed. Ultimately, the sheet **103***b* is fed to the right in the substantially horizontal direction, with an approximately 6 o'clock position at a lower portion of the transporting roll **50** as a wrap around finishing position Pe (corresponds to transporting).

This transporting roll **50** may be structured as a drive roll that rotatingly drives with an appropriate motor and the like as a driving source, or may be structured as a follower roll that is rotatingly driven by the sheet **103***b*.

(2) Slitting Apparatus **40**

A slitting apparatus **40** has a top and bottom pair of discal rotating blades **40***a*, **40***b* in the center in the CD direction. When passing these rotating blades **40***a*, **40***b*, the sheet member **120** that is an original plate of the elastic strip members **121**, **122** is divided in half, and thereby a pair of the elastic strip members **121**, **122** is produced. The elastic strip members **121**, **122** are each fed to a first guide member **60** and a second guide member **160**.

(3) First Guide Member **60**

The first guide member **60** has a tabular oscillating arm **61** provided to the left of the transporting roll **50**. The oscillating arm **61** is arranged so as to cross over the rotational axis C**50** of the transporting roll **50** up and down in the vertical direction. Then, with a spindle portion **65** positioned lower than the rotational axis C**50** as a swivel fulcrum, the oscillating end **61***a* positioned above the rotational axis C**50** can be made to oscillate in the CD direction.

Further, the drive mechanism **70** of the oscillating movement is a motor **72** combined with a crank mechanism **74**, and these will be described later. Further, the spindle portion **65** is, for example, a shaft body **65** that protrudes integrally and to the left from a surface on the left side of the oscillating arm **61**, and is rotatably supported inside an outer cylindrical member **66** via bearings **67**. The outer cylindrical member **66** is fixed to the support wall **92** via an appropriate bracket that is not shown, and thus the oscillating arm **61** is supported to be able to swivel around a rotational central axis C**65** of the spindle portion **65**.

On a right side surface of the oscillating arm **61** that is a surface on a side opposing the transporting roll **50** are rotatably supported a pair of rollers **63**, **64** each around substantially horizontal rotational axes C**63**, C**64**. One of the roller **63** is an oscillating end side roller **63** provided on an oscillating end **61***a*, and the other roller **64** is a spindle portion side roller **64** provided at a position toward the spindle portion **65** side than the oscillating end side roller **63**.

Thus, the elastic strip member **121** of the elastic strip members **121**, **122** fed from the above-described slitter apparatus **40** is first fed from the left to the right along the horizontal direction, and then the elastic strip member **121** passes a through hole **65***h* formed passing through within the spindle portion **65** in the horizontal direction (this through hole **65***h* will be described later) and out a right side surface of the oscillating arm **61**. Then, the elastic strip member **121** is put around an outer circumferential face of the spindle portion side roller **64** that has been set on the same surface to be guided to an upper oscillating end **61***a*. Then, the elastic strip member **121** is wrapped around an outer circumferential face of the oscillating end side roller **63** at the oscillating end **61***a*, and after its travel direction has been reversed substantially downward by the wrapping around, the elastic strip member **121** is supplied from upper left of the transporting roll **50** to a wrap around range Ps to Pe of the sheet **103***b*.

Then while supplying the elastic strip member **121**, the oscillating end side roller **63** reciprocates in the CD direction due to an oscillating movement of the oscillating end **61***a*. Thereby the elastic strip member **121** is joined to the sheet face of the sheet **103***b* in an intended meander pattern by continuously changing the joining position in the sheet surface of the sheet **103***b* in the CD direction. Further, at the time of supplying the elastic strip member **121**, the elastic strip member **121** is restrained to a substantially flat shape by being wrapped around the outer circumferential face of the spindle portion side roller **64** and the outer circumferential face of the oscillating end side roller **63**, so that the elastic strip member **121** is joined in respect to the sheet **103***b* in a surface contacting state (corresponds to joining).

Further, as shown in FIG. **5**B, each of the oscillating end side roller **63** and the spindle portion side roller **64** is arranged on a straight line L**1** that connects the oscillating end **61***a* and the rotational central axis C**65** of the spindle portion **65**. Further, the oscillating end side roller **63** is fixed to the oscillating arm **61** so that its outer circumferential face is facing toward the rotational central axis C**65** of the spindle portion **65** and its orientation in respect to the oscillating arm **61** cannot be changed. On the other hand, the spindle portion side roller **64** is also fixed to the oscillating arm **61** so that its outer circumferential face is facing toward the oscillating end **61***a* of the oscillating arm **61** and its orientation in respect to the oscillating arm **61** cannot be changed.

Thus, with this structure, according to the reciprocating movement of the oscillating end side roller **63**, the outer circumferential face of the spindle portion side roller **64** is always facing toward the oscillating end side roller **63**, so that the elastic strip member **121** can be surely fed toward the oscillating end side roller **63**. As a result, stability of the travel state of the elastic strip member **121** can be obtained, such as the elastic strip member **121** falling off from the oscillating end side roller **63** can be effectively prevented.

Further, according to the above structure, the rotational axis C**63** of the oscillating end side roller **63** and the rotational axis C**64** of the spindle portion side roller **64** are always maintained in a parallel state, regardless of the oscillating movements of the oscillating arm **61**. Thus, a difference in tension that applies on both end edges of the elastic strip member **121** in the width direction that might occur due to the oscillating movements of the oscillating arm **61** can be surely alleviated, and as a result, the elastic strip member **121** falling off from the oscillating end side roller **63** and the spindle portion side roller **64** can be effectively prevented.

Further, in order to obtain stability in the travel state, as shown in FIG. **5**A, a supply route R**121** of the elastic strip member **121** to the spindle portion side roller **64** is aligned in a straight line to the rotational central axis C**65** of the spindle portion **65**, and the roller **64** is arranged so that the outer circumferential face of the spindle portion side roller **64** is in contact with the rotational central axis C**65** of the spindle portion **65**. Thus, movement of the elastic strip member **121** in the CD direction that may occur due to the oscillating movement of the oscillating arm **61**, appears mainly as a torsion in the portion **121***a* of the elastic strip member **121** at an upper side than the spindle portion side roller **64** and is absorbed there, and as a result the elastic strip member **121** falling off from the roller **64** can be effectively prevented.

Further, according to this structure, the spindle portion side roller **64** is arranged so that the outer circumferential face of the spindle portion side roller **64** is in contact with the rotational central axis C**65** of the spindle portion **65**, so that a travel amount of the roller **64** in the CD direction that may occur with the oscillating movement of the oscillating **61** can be made to approximately zero, and thus the elastic strip member **121** falling off from the roller **64** can be effectively prevented.

Incidentally, in this embodiment, as the drive mechanism **70** of the oscillating arm **61**, a so-called direct drive, namely, a structure in which the spindle portion **65** is directly connected with a drive rotational axis **72***a* of a driving source such as a motor is not used, and the driving force of the driving source is transferred to the oscillating arm **61** via the crank mechanism **74**. This is due to the following two reasons.

The first reason is to ensure the above described preferable supply route R**121** regarding the supply of the elastic strip member **121**. Described in more detail, as shown in FIG. **5**A, in relation to the arrangement position of the slit apparatus **40**, the elastic strip member **121** is supplied from the left of the oscillating arm **61**. However, the spindle portion **65** is positioned to the left of the oscillating arm **61**. Therefore, in the case where the drive rotational axis **72***a* of the motor **72** is matched with the spindle portion **65** and connected directly, this motor **72** gets in the way and it becomes difficult to set the preferable supply route R**121** of the elastic strip member **121** as described above, that is a supply route R**121** that is aligned in a straight line with the rotational central axis C**65** of the spindle portion **65**.

On the contrary, in the case where a driving force of the oscillating movement of the oscillating arm **61** is to be input to a position PP different from the spindle portion **65** by the crank mechanism **74**, as in this embodiment shown in FIG. **5**A, by forming the through hole **65***h* in respect to the spindle portion **65** substantially concentrically as the rotational central axis C**65** of the spindle portion **65**, and also passing through the elastic strip member **121** in the through hole **65***h*, the supply route R**121** of the elastic strip member **121** aligned in a straight line with the rotational central axis C**65** of the spindle portion **65** described above can be secured. As a result, the travel state of the elastic strip member **121** can be stabilized. Note that, such a through hole **65***h* can be expressed as a communicating space for communicating a side opposing the transporting roll **50** (right side) and a side not opposing the transporting roll **50** (left side). Further, it is needless to say that the oscillating arm **61** is also formed with a through hole **61***h* in the left to right direction so as to correspond with the through hole **65***h*.

The second reason is to increase movement stability in oscillation of the oscillating arm **61**. Namely, in the case where the crank mechanism **74** is used, at the time of making the oscillating arm **61** perform the oscillating movement, the drive rotational axis **72***a* of the motor **72** needs only to be rotated in one direction, that is, the drive rotational axis **72***a* of the motor **72** does not have to be rotated in the forward and reverse direction. As a result, since at least switching control does not lie in the rotation direction of the motor **72**, stability in the oscillating movement of the oscillating arm **61** becomes outstanding.

Such a crank mechanism **74** (corresponds to a conversion transmission mechanism) has on a drive rotating axis **72***a* of the motor **72** in a horizontal direction in the MD direction a circular disk member **75** (corresponds to a rotating member) that has been fixed integrally and concentrically and a rod-shaped link member **76** (corresponds to a connecting member) that connects the disk member **75** and a power point PP of the oscillating arm **61**. Then, a position eccentric from a drive rotating axis **72***a* in the disk member **75** is connected with an end portion of the link member **76** by a coupling pin **78** or the like. Thus, every time the disk member **75** rotates once, the link member **76** is reciprocated once only in its longitudinal direction, and the oscillating arm **61** performs an oscillating movement only once by this one reciprocating movement.

Note that, here, as connecting positions of the link member **76** in the disk member **75**, there may preferably be prepared a plurality of positions P**75**, P**75** . . . , and moreover these plurality of positions P**75**, P**75** . . . may be different from each other in their eccentric amounts that is a distance to the drive rotating axis **72***a*. If it is set in this way, it is possible to easily change an amplitude amount of the oscillating movement of the oscillating arm **61** by selecting each connecting position P**75**, P**75** . . . on the disk member **75**. Thus, if each connecting position P**75**, P**75** . . . is set in advance corresponding to the size of the disposable diaper **1**, thereafter the operator needs only to select the connecting position P**75** of a size to be manufactured next, to be able to switch easily and immediately to a meander pattern corresponding to the relevant size. Thus, it becomes possible to remarkably shorten a down time that accompanies size changing of the disposable diaper **1**.

Further, as in the example in FIG. **5**B, preferably each of the connecting positions P**75**, P**75** . . . may be set in positions different from each other in regard to a circumferential direction of the disk member **75**. In the illustrated example, a rotation radius that is an eccentric amount of the connecting positions P**75**, P**75** . . . are gradually decreased as it progresses along one direction in the circumferential direction of the disk member **75**, as if these connecting positions P**75**, P**75** . . . exist on one whirl line in appearance. In the case where positions in the circumferential direction of each of the connecting positions P**75**, P**75** . . . are different from each other in this way, supposing that in the case where a difference in an eccentric amount of one connecting position P**75** and an eccentric amount of another connecting position P**75** is small, interference of the connecting positions P**75**, P**75** . . . from each other can be effectively avoided.

For example, in the case where the coupling pin **78** is used to connect the disk member **75** and the link member **76**, it is necessary to provide pin holes to the disk member **75** side, and it is possible to avoid these pin holes from becoming connected to each other. Thus, it is possible to change the eccentric amounts of these connecting positions P**75** in small increments, and as a result it is possible to change the amplitude amount of the oscillating arm **61** in small increments.

Incidentally, if a curve that connects these connecting positions P**75**, P**75** . . . is in a whirl shape as described above, the operator can instantly recognize a size of amplitude corresponded to each connecting position P**75** based on the aligning order of the connecting positions P**75** in the circumferential direction of the disk member **75**. Therefore, it is possible to decrease frequency in occurrence of selecting mistakes of the connecting position P**75** at the time of changing the size.

By the way, as shown in FIG. **5**B, the power point PP of the oscillating arm **61** of this embodiment is provided at a position that is at an opposite side to the oscillating end **61***a* of the oscillating arm **61** sandwiching a rotational central axis C**65** of the spindle portion **65**. That is, the oscillating arm **61** has an extending portion **61***b* that extends toward an opposite side of the oscillating end **61***a* from the spindle portion **65**, and a power point PP is set at an end portion of the extending portion **61***b*. An end portion of the link member **76** is connected to this power point PP by a coupling pin **78** and the like. However, the position of the power point PP is not limited to the above as long as it is at a portion other than the spindle portion **65**. For example, as shown in FIG. **6**, the PP may be set at a portion in between the spindle portion **65** and the oscillating end **61***a* of the oscillating arm **61**. Note that, selection of either the structure in FIG. **5**B or the structure in FIG. **6** is decided based on the layout of the motor **72** and the crank mechanism **74** and the like.

(4) The Second Guide Member **160**

The second guide member **160** is a member with roughly the same structure as the above-described first guide member **60**. As shown in FIG. **5**B, the second guide member **160** is arranged more to the back side than the first guide member **60** in the CD direction. Thus, the elastic strip member **122**, that this second guide member **160** is in charge of, is attached more to the back side in the CD direction than the elastic strip member **121** and in parallel thereto, the elastic strip member **121** being attached to the sheet **103***b* by the first guide member **60**. However, according to the disposable diaper **1**, as shown in FIG. **4**, an arrangement pattern in which the elastic strip member **121** and the elastic strip member **122** are partially overlapped is possible. In that case, if the first guide member **60** and the second guide member **160** are arranged in parallel, these guide members **60**, **160** will come in collision with each other and cannot form the above-described pattern.

Here, in order to avoid the above collision, as shown in FIG. **5**A, the position of the second guide member **160** in a circumferential direction Dc of the transporting roll **50** is made different from that of the first guide member **60**. That is, the second guide member **161** is arranged displaced to an upstream side in the circumferential direction Dc than the first guide member **61**.

In more detail, as shown in FIG. **5**A, the oscillating arm **161** of the second guide member **160** is at a position in which the oscillating arm **61** of the first guide member **60** is rotatingly moved to an upstream side in the circumferential direction Dc for a predetermined rotating angle θ only around an imaginary axis, that is not shown, parallel to the rotational axis C**50** of the transporting roll **50**, the rotating angle θ being 90° in the shown example. Thus, the oscillating arm **161** is arranged above the first guide member **60** and the transporting roll **50**, and striding over the rotational axis C**50** of the transporting roll **50** to the left and right in the horizontal direction. With the spindle portion **165** that is positioned more to the left of the rotational axis C**50** as a swivel fulcrum, the oscillating end **161***a* positioned more to the right than the rotational axis C**50** is structured so as to be able to oscillate in the CD direction.

The driving mechanism **170** for the oscillating movement is the motor **172** combined with the crank mechanism **174**, as in the case for the first guide member **160**. Further, the spindle **165** is a shaft body **165** that extends integrally and upwards from an upper surface of the oscillating arm **161**, as similar to the case with the first guide member **160**, and this shaft body **165** is supported rotatably in an outer cylindrical member **166** via the bearings **167**. Note that, the outer cylindrical member **166** is fixed to the support wall **92**.

Further, on a lower surface of the oscillating arm **161** which is a surface on a side opposing the transporting roll **50**, each of a pair of rollers **163**, **164** is rotatably supported around horizontal rotating axes C**163**, C**164**. One roller **163** is an oscillating end side roller **163** provided at an oscillating end **161***a*, and another roller **164** is a spindle portion side roller **164** provided more to the spindle portion **165** than the oscillating end side roller **163**.

Therefore, the elastic strip member **122** that is fed from the slitter apparatus **40** is fed from the left to the right in the horizontal direction, while being in parallel in the CD direction next to the elastic strip member **121** that is sent to the above-described first guide member **60**. At a position in which a rotational central axis C**165** of the spindle portion **165** of the second guide member **160** matches a plan position, a travel direction of the elastic strip member **122** is changed upwards in the vertical direction by a direction changing roller **190** to reach the spindle portion side roller **164**, and is put around the outer circumferential face of the spindle portion side roller **164**. Then, with the spindle portion side roller **164**, the elastic strip member **122** is guided to the oscillating end **161***a* that is to the right than the transporting roll **50**, and thereafter, after the travel direction is reversed to the left by the oscillating end side roller **163** at the oscillating end **161***a*, the elastic strip member **122** is supplied close to the wrap around starting position of the sheet **103***b* from the upper right of the transporting roll **50**.

Then, during the above supplying, the oscillating end side roller **163** reciprocates in the CD direction due to the oscillating movement of the oscillating end **161***a*, thus the elastic strip member **122** is joined to a sheet face of the sheet **103***b* in a desired meander pattern with its joining position in the sheet face of the sheet **103***b* being continuously changed in the CD direction. Further, at the time of this supply, the elastic strip member **122** is restrained in a substantially flat shape by wrapping around the outer circumferential face of the spindle portion side roller **164** and an outer circumferential face of the oscillating end side roller **163**, so that the elastic strip member **122** is joined to the sheet **103***b* in a surface contact state.

Note that, the structure shown in below (a) to (c) are all the same as those for the first guide member **60**, and therefore their detailed description is omitted.

(a) Each of the oscillating end side roller **163** and the spindle portion side roller **164** are arranged on a straight line that connects the oscillating end **161***a* of the oscillating arm **161** and the rotational central axis C**165** of the spindle portion **165**.

(b) The oscillating end side roller **163** is fixed to the oscillating arm **161** so that its outer circumferential face is facing toward the rotational central axis C**165** of the spindle portion **165** of the oscillating arm **161** with its orientation in respect to the oscillating arm **161** being unable to be changed and the spindle portion side roller **164** is also fixed to the oscillating arm **161** so that its outer circumferential face is facing toward the oscillating end **161***a* of the oscillating arm **161** with its orientation in respect to the oscillating arm **161** being unable to be changed.

(c) The supply route R**122** of the elastic strip member **122** to the spindle portion side roller **164** is aligned in one line with the rotational central axis C**165** of the spindle portion **165**, and the spindle portion side roller **164** is arranged so that the circumferential face of the spindle portion side roller **164** is contacting the rotational central axis C**165** of the spindle portion **165**.

Other Embodiments

The embodiments of the present invention have been described above, but the present invention is not limited to the embodiments, and below modifications are possible.

In the above-described embodiment, the crank mechanism **74** (**174**) is illustrated as a conversion transmission mechanism that transfers the rotating movement of the drive rotating axis **72***a* of the motor **72** by converting it to a reciprocating movement to the oscillating arm **61** (**161**), and the power point PP is set to an end portion of the extending portion **61***b* of the oscillating arm **61**. As long as a power point PP is set at a position different from the spindle portion **65** (**165**) however, it is not limited thereto.

For example, as shown in FIG. **7**, the drive rotational axis **72***a* of the motor **72** may be arranged in parallel in respect to the spindle portion **65**, with pulleys **81**, **82** provided fixed to both the spindle portion **65** and the drive rotational axis **72***a*, and an endless belt **79** may be put around these pulleys **81**, **82**, and a driving force that is needed for the oscillating movement of the oscillating arm **61** may be transferred from the drive rotational axis **72***a* to the spindle portion **65** via the endless belt **79**. Note that, in this case, it is needless to say that the drive rotational axis **72***a* is to be controlled to repeat a forward and reverse rotation.

Further, as a driving source to drive the oscillating arm **61** (**161**), a cylinder in which a piston appears by an appropriate working fluid such as a hydraulic fluid or air may be used. In this case, for example, on the one hand the piston is to be connected to the oscillating arm **61** (**161**), whereas the cylinder is to be attached to the support wall **92** via an attaching mechanism that can oscillate such as a trunion or a crevice shape.

In the above-described embodiment, the manufacturing method of a composite sheet according to this invention is applied for manufacturing of the pants type diaper **1**, but it is not limited thereto and may be applied for manufacturing of expanding type diapers (a type of diaper in which the front torso area **1***a* and the back torso area **1***c* are held fixed by a tape fastener when wearing).

In the above-described embodiment, there is illustrated a structure in which an oscillating arm **61** (**161**) has two rollers of an oscillating end side roller **63** (**163**) and a spindle portion side roller **64** (**164**), but it is not limited thereto, and one roller may be provided in between the oscillating end side roller **63** (**163**) and the spindle portion side roller **64** (**164**). Note that, in this case the rotating axis of the roller to be additionally provided may be in parallel to the rotational axis C**64** (C**164**) of the spindle portion side roller **64** (**164**).

In the above-described embodiment, as shown in FIG. **5**A, the rotational central axis C**65** of the spindle portion **65** of the first guide member **60** is oriented in the left-right direction (horizontal direction), the rotational central axis C**165** of the spindle portion **165** of the second guide member **160** is oriented in the up-down direction (vertical direction), and the rotational axis C**50** of the transporting roll **50** is oriented in the CD direction (horizontal direction). However, it is not limited thereto, as long as the rotational central axis C**65** (C**165**) of the spindle portion **65** (**165**) of the first guide portion **60** or the second guide portion **160** and the rotational axis C**50** of the transporting roll **50** are in a perpendicular relationship with each other.

In the above-described embodiment, the rotational axis C**63** (C**163**) of the oscillating end side roller **63** (**163**) and the rotational axis C**64** (C**164**) of the spindle portion side roller **64** (**164**) are in the substantially horizontal direction. The reason is to hand over the elastic strip member **121** (**122**) in a substantially flat shape with little torsion in respect to the transporting roll **50** with the rotational axis C**50** in the horizontal direction that is the CD direction. Thus, the orientation of the rotational axes C**63** (C**163**), C**64** (C**164**) of the oscillating end side roller **63** (**163**) and the spindle portion side roller **64** (**164**) is not limited to a substantially horizontal direction in any way, and can be changed according to a direction in which the rotational axis C**50** of the transporting roll **50** faces. That is, the rotational axis C**63** (C**163**) of the oscillating end side roller **63** (**163**) and the rotational axis C**64** (C**164**) of the spindle portion side roller **64** (**164**) may be arranged so that the face that the rotational axes C**63** (C**163**), C**64** (C**164**) make with the oscillating movement of the oscillating arm **61** (**161**) is to be parallel to the rotational axis C**50** of the transporting roll **50**. Furthermore, the oscillating end side roller **63** (**163**) and the spindle portion side roller **64** (**164**) may be arranged so that the rotational axes C**63** (C**163**), C**64** (C**164**) become perpendicular to the rotational central axis C**65** (C**165**) of the spindle portion **65** (**165**) that is in a perpendicular relationship with the rotational axis C**50** of the transporting roll **50**.

In the above-described embodiment, a flat bone roll that has a circumferential face that is flat across the width direction (CD direction) of the roller is used as the oscillating end side roller **63** (**163**) and the spindle portion side roller **64** (**164**), but it is not limited thereto in any way. For example, a crowned roller may be used. This crowned roller refers to a roller with a largest diameter portion of the roller set in a central portion in the width direction. With this roller, the elastic strip member **121** (**122**) put around the outer circumferential face is given a centripetal force toward the central portion in the width direction of the roller by the largest diameter portion of the outer circumferential face so that it becomes difficult for the elastic strip member **121** (**122**) to fall off from the roller. As an example such a crowned roller, there may be, for example, such as a roller formed with annular ribs along a circumferential direction in only the central portion in the outer circumferential face, or a roller that has a radius that gradually increases from end portions toward the central portion of the outer circumferential face.

In the above-described embodiment, a hot-melt adhesive was applied with an adhesive applying apparatus to the elastic strip members **121**, **122**, but it is not limited thereto in any way as long as the sheet **103***b* and the elastic strip members **121**, **122** can be joined together. For example, the adhesive may be applied to just the sheet **103***b*, or to both the elastic strip members **121**, **122** and the sheet **103***b*.

REFERENCE SIGNS LIST

1 disposable diaper (absorbent article), **1***a* front torso area, **1***b* crotch area, **1***c* back torso area, **2** surface sheet, **3** back face sheet, **3***a* inner sheet, **3***b* outer sheet, **4** absorbent body, **10** around-leg concave portions, **11** end edge portion flaps, **12** side edge portion flaps, **16** torso elastic member, **21** front elastic strip member, **22** back elastic strip member, **30** manufacturing equipment, **40** slitting apparatus, **40***a* discal rotating blade, **40***b* discal rotating blade, **50** transporting roll, **60** first guide member, **61** oscillating arm, **61***a* oscillating end, **61***b* extending portion, **61***h* through hole, **63** oscillating end side roller, **64** spindle portion side roller, **65** spindle portion, **65***h* through hole, **66** outer cylindrical member, **67** bearings, **70** drive mechanism, **72** motor (driving source), **72***a* drive rotational axis, **74** crank mechanism (conversion transmission mechanism), **75** circular disk member (rotating member), **76** rod-shaped link member (connecting member), **78** coupling pin, **79** endless belt, **81** pulley, **82** pulley, **92** support wall, **103***b* sheet (continuous body of a sheet), **120** sheet member, **121** elastic strip member (continuous body of elastic member), **121***a* portion, **122** elastic strip member (continuous body of an elastic member), **160** second guide member, **161** oscillating arm, **161***a* oscillating end, **163** oscillating end side roller, **164** spindle portion side roller, **165** spindle portion, **166** outer cylindrical member, **167** bearings, **170** driving mechanism, **172** motor (driving source), **174** crank mechanism (conversion transmission mechanism), **190** direction changing roller, CL center line, C**50** rotational axis, C**63** rotational axis, C**64** rotational axis, C**65** rotational central axis, C**163** rotational axis, C**164** rotational axis, **0165** rotational central axis, R**121** supply route, R**122** supply route, R region, P**75** connecting position, PP power point, Pe finishing position, Ps starting position

The invention claimed is:

1. A method of manufacturing a composite sheet of an absorbent article, the method including joining a continuous body of an elastic member in a predetermined meander pattern in respect to a continuous body of a sheet transported continuously in a transporting direction, the method comprising:

transporting the continuous body of the sheet by wrapping the continuous body of the sheet around an outer circumferential face of a transporting roll that rotates in a direction along the transporting direction; and

joining the continuous body of the elastic member to a portion of the continuous body of the sheet wrapped around the transporting roll by feeding the continuous body of the elastic member to the continuous body of the sheet via an oscillating arm that oscillates by a driving force in an intersecting direction intersecting the transporting direction with a spindle portion as a swivel fulcrum,

wherein the oscillating arm includes an oscillating end side roller arranged at an oscillating end side of the oscillating arm and a spindle portion side roller arranged at a spindle portion side,

wherein in the joining, the continuous body of the elastic member supplied toward the spindle portion side roller through a supply route along a rotational central axis of the spindle portion is put around an outer circumferential face of the spindle portion side roller and an outer circumferential face of the oscillating end side roller successively and guided to the continuous body of the sheet,

wherein the driving force is applied to the oscillating arm at a position different from a position of the spindle portion, and

wherein the rotational central axis of the spindle portion is tangential with an outer circumferential face of the spindle portion side roller.

2. A The method according to claim **1**, wherein

the oscillating end side roller and the spindle portion side roller are arranged on a face of the oscillating arm on a side opposing the transporting roll,

the spindle portion has a communicating space that communicates the side opposing the transporting roll and a side not opposing the transporting roll, along the rotational central axis of the spindle portion,

the continuous body of the elastic member that is fed through the supply route along the rotational central axis of the spindle portion reaches a face of the oscillating arm on the side not opposing the transporting roll, and ends at the spindle portion side roller by passing through the communicating space.

3. The method according to claim **2**, wherein the communicating space is a through hole in the spindle portion along the rotational central axis of the spindle portion.

4. The method according to claim **1**, wherein

when the driving force is applied to the oscillating arm,

rotatingly a driving source about a drive rotational axis thereof and

converting, by a conversion transmission mechanism, a rotating movement of the drive source to a reciprocating movement and transmitting, by the conversion transmission mechanism, the reciprocating movement to the oscillating arm,

the conversion transmission mechanism has

a rotating member rotating about the drive rotational axis and

a coupling member that couples the oscillating arm at the position where the driving force is applied to the oscillating arm to the rotating member a position eccentric from the drive rotational axis of the rotating member, and

the rotating member is set with a plurality of the eccentric positions each having different eccentric amounts from each other.

5. The method according to claim **1**, wherein

the transporting roll rotates around a rotational axis,

the oscillating end side roller and the spindle portion of the oscillating arm are arranged so as to sandwich the rotational axis of the transporting roll in between, and

a direction of travel of the continuous body of the elastic member is reversed by the oscillating end side roller and the continuous body of the elastic member is supplied to the transporting roll.

6. The method according to claim **1**, wherein

the spindle portion side roller is fixed to the oscillating arm in a state in which the outer circumferential face of the spindle portion side roller is facing toward the oscillating end of the oscillating arm.

7. The method according to claim **1**, wherein

the intersecting direction is perpendicular to the transporting direction,

the rotational central axis of the spindle portion is perpendicular to a rotational axis about which the transporting roll is to be rotated,

the oscillating end side roller is arranged so that a rotational axis of the oscillating end side roller is perpendicular to the rotational central axis of the spindle portion, and

the spindle portion side roller is arranged so that a rotational axis of the spindle portion side roller is perpendicular to the rotational central axis of the spindle portion.

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